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UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Entomology and Plant Quarantine
Washington, D. C.

OUTLINE OF PLAN OF OPERATIONS FOR COOPERATIVE PROTECTION
OF CROPS AGAINST GRASSHOPPERS DURING 1939
(Contingent on the Availability of Necessary Federal Funds)

This program varies from that of 1938 only in minor detail, mostly of an administrative nature, except that in areas in which the dominant species show strong migratorial tendencies, and in which areas, where, due to sparse human populations or the presence of large areas of public, abandoned, or reverted land, it would be impossible for local persons to cope with the manpower demands necessary to carry out a successful program. In these areas, a joint Federal-State program is proposed which will undertake responsibility for the application of bait.

1. The Bureau of Entomology and Plant Quarantine will be responsible for the administration and supervision of expenditures of all funds specifically appropriated or allotted to the U. S. Department of Agriculture for grasshopper control. It shall make recommendations and give technical advice to all agencies of the Department assisting in the cooperative effort to control these pests. It will consider and recommend action to be taken by any other agency of the Federal government seeking counsel from the Department. It shall act for the Secretary of Agriculture on all matters pertaining to grasshopper control.

2. Aid from funds specifically appropriated or allotted for grasshopper control shall be extended to those localities where grasshoppers occur in outbreak numbers over wide areas, when the States shall have provided organization and facilities and, in addition, shall have given to the Bureau assurance that they are prepared to carry out their part of the cooperative undertaking in an effective manner.

3. Emphasis of Federal cooperation will be placed on crop protection, and activities directed against non-migratorial species of grasshoppers will be restricted chiefly to areas in, and near, agricultural crops; however such activities directed against the two principal migratorial species, namely, longipennis and mexicanus, will be extended to concentration grounds of nymphs and adults in areas where effective control is believed to be feasible and practicable.

THE UNIVERSITY OF CHICAGO
DIVISION OF THE PHYSICAL SCIENCES

REPORT OF THE
COMMISSIONER OF THE
BUREAU OF MINES

FOR THE YEAR
ENDING
JUNE 30, 1904

THE BUREAU OF MINES, U. S. DEPARTMENT OF THE INTERIOR, has the honor to acknowledge the receipt of the report of the Commissioner of the Bureau of Mines for the year ending June 30, 1904. The report contains a full and complete statement of the work of the Bureau during the year, and is a valuable contribution to the knowledge of the mineral resources of the United States.

The report is divided into two parts, the first of which contains a general statement of the work of the Bureau, and the second of which contains a detailed statement of the work of the various divisions of the Bureau. The first part of the report is a general statement of the work of the Bureau, and is a valuable contribution to the knowledge of the mineral resources of the United States.

The second part of the report is a detailed statement of the work of the various divisions of the Bureau. This part of the report is a valuable contribution to the knowledge of the mineral resources of the United States, and is a valuable contribution to the knowledge of the mineral resources of the United States.

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4. Control measures, based on research and practical experience, will be conducted in any State by methods jointly approved by the Bureau of Entomology and Plant Quarantine and the State Entomological Agencies.

5. Estimates as to bait needs and funds required to carry out control operations will be based on fall egg surveys and other data relating to the grasshopper problem. Allotments and deliveries of bait materials to States will be based on comparable needs, spring hatch, natural control, population development and movement, and on compliance with necessary State or local cooperation.

6. All bait materials purchased with Federal funds will remain the property of the U. S. Department of Agriculture and will be subject to Federal control in compliance with fiscal regulations until spread as grasshopper bait.

7. Poison bait will be delivered as raw materials to a local mixing station in the county or community for mixing and local delivery, or will be mixed at central mixing plants approved or operated by the Bureau of Entomology and Plant Quarantine and when necessary, delivered to distribution points within reasonable hauling distance, dependent on administrative advisability as determined by representatives of the Bureau of Entomology and Plant Quarantine and cooperating State officials. Any further transportation of mixed bait from central mixing plants or points of distribution shall be provided at State or local expense, in lieu of their bearing the expense of providing and operating local mixing stations. In most instances, it is believed that the method of shipping raw materials to local community mixing stations, as was in effect in 1938, is a satisfactory procedure; however, in areas heavily infested with migratorial species, it is believed to be more practicable to establish central mixing plants where large supplies of raw materials can be concentrated.

8. Locations of all local mixing stations must have joint approval of the Bureau of Entomology and Plant Quarantine and the State Leader. As a rule, not more than one local mixing station per county will be approved, since the establishment of numerous, local mixing stations for the primary purpose of avoiding local hauls results in expensive L.C.L. shipments of bait materials and frequent mixing mill shutdowns, due to the impracticability of maintaining a constant supply of three or more raw materials in the proper proportions. Local mixing stations will be operated at the expense of State or local agencies under the general joint supervision of the Bureau of Entomology and Plant Quarantine and the State organization, and the county leader will maintain and submit to the Federal grasshopper control headquarters and to the State Leader on standard forms provided for the purpose, such records of operation as may be deemed necessary for determining local usage and needs for additional supplies of raw materials.

The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the problem is one of the most important and interesting in the history of science.

The second part of the paper is devoted to a detailed discussion of the various theories of the origin of life. It is shown that the most plausible theory is that of the origin of life from non-living matter.

The third part of the paper is devoted to a discussion of the evidence in support of the various theories of the origin of life. It is shown that the evidence is in favor of the theory of the origin of life from non-living matter.

The fourth part of the paper is devoted to a discussion of the various problems connected with the origin of life. It is shown that the most important problems are the problem of the origin of the first living organisms, the problem of the origin of the first cells, and the problem of the origin of the first molecules of organic matter.

The fifth part of the paper is devoted to a discussion of the various methods of investigation of the origin of life. It is shown that the most important methods are the study of the fossil record, the study of the present-day organisms, and the study of the chemical reactions which are thought to have taken place in the early stages of the origin of life.

9. To the extent that funds are available and when conditions seem to merit, a reserve of bait materials of approximately 25% of estimated needs will be procured and delivered to storage places at approved points in advance of actual control operations, and a reasonable reserve will be maintained in such storage places until the peak of control work has passed. Initial quantities of bait materials to be delivered will be determined by representatives of the Bureau of Entomology and Plant Quarantine and State Leaders, and reserves will be maintained on a basis of usage and on field observations of grasshopper hatch, populations, and natural control. The Bureau of Entomology and Plant Quarantine will assume full responsibility for maintaining bait supplies in all States in keeping with proportionate needs and to the extent of available funds. This procedure will eliminate heavy purchases on inflated markets, congestion of transportation, delays in loading and delivery, unnecessary losses of crops, and general confusion. State leaders will be constantly consulted as to deliveries and as to conditions which may affect fall survey estimates. They will be advised of each shipment when made, as well as of the total tonnage which may be available for the State.

10. The cooperating State agencies shall be responsible for the utilization and distribution of bait, including all labor costs; Provided, that in special cases as herein later specified, the Federal government may share in the labor cost of distribution.

11. In sparsely settled areas where the infestation consists of species of grasshoppers which have definite migratorial tendencies and in which the acreage is predominantly publicly-owned, abandoned or idle, the application of bait shall be by Federal-State cooperation with available farmer assistance, such areas to be mutually agreed upon. In this activity, the Bureau of Entomology and Plant Quarantine will provide supervision of activities under methods and procedures jointly determined by the State Leader and representatives of the Bureau. Control operations will embody the longipennis area comprising parts of Colorado, New Mexico, Oklahoma, and Texas, and certain areas in Montana, North Dakota, South Dakota, and Wyoming known to be generally infested with mexicanus and will involve:

- (a) The procurement, delivery, and mixing of bait materials.
- (b) Local transportation of bait materials; transportation of mixed bait to the field and transportation of distributors in bait-spreading operations.
- (c) An adequate number of bait spreaders, part of which should be of a larger size than those now in use.

(d) Labor for distributing operations and scouts for locating and reporting infestations.

(e) Adequate supervisory assistance.

(f) Establishment and operation of camps where necessary.

The responsibility for providing the above items, which will be prorated between the Federal government and the State or local cooperating agencies, is left for further determination.

12. No charge shall be made for bait or bait materials provided by the Federal government. States, counties, or communities shall not make a charge to farmers other than that necessary to cover the cost of local mixing operations, storage and local transportation of bait or bait materials, plus the cost of materials provided by agencies other than the Federal government. Records of any such charge shall be available for audit by the State Leader and the Bureau of Entomology and Plant Quarantine. Each farmer or land-owner shall be free, however, to mix his allotted bait from Federal materials under supervision of the approved local mixing station, in which event, no charge shall be made. Notice to this effect must be posted at each local mixing station. No bait materials purchased with Federal funds will be released to individuals for home mixing, and no such materials will be released to such sub-mixing stations as are not jointly approved by the Bureau of Entomology and Plant Quarantine and the State Leader.

13. The Bureau of Entomology and Plant Quarantine will maintain a staff of supervisors, a State supervisor being assigned to work with State Leaders in planning, directing, and supervising control activities. Assistant supervisors will be assigned to States as the need exists and to the extent that funds will permit; such assistant supervisors to work under the general, joint supervision of the State Leader and the State Supervisor, and jointly with the State District Leaders.

To qualify for aid from funds specifically appropriated or allotted by the Federal government for grasshopper control, States must submit to the Bureau of Entomology and Plant Quarantine for consideration and approval, a statement showing that they will:

(a) Establish an active, general committee to be known as the Grasshopper Control Committee, which shall be responsible for the coordination of State agencies concerned with all phases of work incident

to the control of grasshoppers where practicable. It should include representatives from the following State organizations, if such organizations exist within the State: State Department of Agriculture; State Pest Control Agency (if separate from the State Department of Agriculture); State Agricultural College; State Agricultural Experiment Station (if a separate unit); State Agricultural Extension Service; and State Fish and Game Commissioner (if an independent State unit).

(b) Designate a trained entomologist, technical agricultural worker, or crop pest control official to act as its duly authorized representative. He will devote his full time, if needed, as State Leader in carrying out the cooperative obligations assumed by the State, counties, or communities, and will work in cooperation with representatives of the Bureau of Entomology and Plant Quarantine in formulating a work program and in supervising and carrying out control operations.

14. The State Leader, in consultation with Bureau representatives will:

(a) Divide the infested portion of the State into districts, when such procedure seems necessary, for the purpose of effectively carrying out control operations.

(This paragraph to be the subject of special consideration by State Leaders with reference to providing local funds.)

(b) Select, where possible and needed, an individual paid by the State in each established district, this individual to be known as Assistant State Leader, who will devote full time to grasshopper control work within the district, and who will be provided at State or local expense with necessary office facilities and means for travel and, as occasion demands, necessary assistance.

(c) Provide in areas where bait is mixed at local mixing stations at State or local expense, adequate and approved storage space for bait materials to be subsequently mixed at local mixing stations as early as practical. Storage need not be provided in each county if adequate storage

can be located at convenient points which will serve more than one county, provided counties so served will furnish local transportation of such stored materials to the respective counties. Satisfactory storage to provide for advance purchases and deliveries and maintenance of a reasonable reserve of bait materials is of vital importance and indispensable to a successful control program. It is recognized that needs cannot be accurately anticipated, but the maintenance of a reasonable reserve is imperative.

(d) Provide at State or local expense for the establishment and maintenance of such local mixing stations at such points as may be determined in advance by the State Leader and a representative of the Bureau of Entomology and Plant Quarantine. Definite locations of mixing stations and storage plants must be determined in advance of shipping, and no shipments will be made to other points except on mutual approval.

(e) Provide at State or local expense for local storage of bait mixed at central mixing plants operated by the Bureau and delivered to local distribution points in advance of actual distribution needs.

(f) When local mixing stations are utilized, to provide at State or local expense the full-time services of a foreman of storage and mixing operations satisfactory to the State Leader and the Bureau of Entomology and Plant Quarantine, whose duties it will be to receive, unload, store, and mix bait, and to maintain and furnish through the County Leader at stipulated intervals to the Bureau of Entomology and Plant Quarantine and to the State Leader, reports of such activities on standard forms provided for the purpose. He must be provided with ample laborers and assistants, at the expense of State or local agencies, to carry out these operations.

(g) Require that provision be made for adequate local transportation facilities for movement of bait materials from cars, to and from storage plants, and local mixing stations. Where mixed bait is provided by the Federal government at centralized mixing or distribution points, to require that truck transportation to nearby counties or communities be provided.

(h) Provide for the local distribution and utilization of bait in accordance with procedure jointly approved by the Bureau of Entomology and Plant Quarantine and the State Leader.

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(i) Provide for such cooperation as may have been determined in the control of heavy outbreaks of grasshoppers having marked migratorial tendencies in areas where joint Federal-State control work is undertaken as outlined in Paragraph 11, herein.

(j) Provide, in so far as practicable, for uniform participation in the effort to control grasshoppers throughout all infested sections and to encourage farmers to distribute bait on their own lands and also assist in community effort in distributing bait on adjacent, uncultivated lands where such action is necessary to protect crops.

When in any grasshopper infested area, unusual conditions prevail making it impractical to carry on necessary cooperative work under the conditions set forth in this program, such conditions may be substituted, modified, or waived on mutual agreement and approval by the Bureau of Entomology and Plant Quarantine and the cooperating States.

/s/ AVERY S. HOYT
Acting Chief, Bureau of Entomology
and Plant Quarantine

Approved:

/s/ HENRY A. WALLACE
Secretary of Agriculture

December 15, 1938

(Date)

The first part of the report is devoted to a description of the work done during the year. It is divided into two main sections, the first of which deals with the work done in the laboratory and the second with the work done in the field.

The second part of the report is devoted to a description of the results of the work done during the year. It is divided into two main sections, the first of which deals with the results of the work done in the laboratory and the second with the results of the work done in the field.

The third part of the report is devoted to a description of the conclusions drawn from the work done during the year. It is divided into two main sections, the first of which deals with the conclusions drawn from the work done in the laboratory and the second with the conclusions drawn from the work done in the field.

The fourth part of the report is devoted to a description of the recommendations made as a result of the work done during the year. It is divided into two main sections, the first of which deals with the recommendations made as a result of the work done in the laboratory and the second with the recommendations made as a result of the work done in the field.

The fifth part of the report is devoted to a description of the summary of the work done during the year. It is divided into two main sections, the first of which deals with the summary of the work done in the laboratory and the second with the summary of the work done in the field.

The sixth part of the report is devoted to a description of the bibliography of the work done during the year. It is divided into two main sections, the first of which deals with the bibliography of the work done in the laboratory and the second with the bibliography of the work done in the field.

The seventh part of the report is devoted to a description of the index of the work done during the year. It is divided into two main sections, the first of which deals with the index of the work done in the laboratory and the second with the index of the work done in the field.

The eighth part of the report is devoted to a description of the appendix of the work done during the year. It is divided into two main sections, the first of which deals with the appendix of the work done in the laboratory and the second with the appendix of the work done in the field.

The ninth part of the report is devoted to a description of the conclusion of the work done during the year. It is divided into two main sections, the first of which deals with the conclusion of the work done in the laboratory and the second with the conclusion of the work done in the field.